CCA Math Bonanza

Tiebreaker Round

1. Compute the greatest 4-digit number $\underline{ABCD}$ such that $(A^3 + B^2)(C^3 + D^2) = 2015$.

2. If a, b, c are the roots of $x^3 + 20x^2 + 1x + 5$, compute $(a^2 + 1)(b^2 + 1)(c^2 + 1)$.

3. Positive integers (not necessarily unique) are written, one on each face, on two cubes such that when the two cubes are rolled, each integer $2 \leq k \leq 12$ appears as the sum of the upper faces with probability $\frac{6-|7-k|}{36}$. Compute the greatest possible sum of all the faces on one cube.